

WHAT IS CLAIMED IS:

1. An electrooptic system array having a plurality of electron lenses, comprising:
5 at least two electrodes arranged along paths of a plurality of charged-particle beams, each of said at least two electrodes having a plurality of apertures on the paths of the plurality of charged-particle beams;
and
10 a shield electrode which is interposed between said at least two electrodes and has a plurality of shields corresponding to the respective paths of the plurality of charged-particle beams.
- 15 2. The array according to claim 1, wherein each shield has an aperture on a path of a corresponding charged-particle beam.
- 20 3. The array according to claim 1, wherein said shield electrode is constituted by integrating the plurality of shields.
- 25 4. The array according to claim 1, wherein said shield electrode is insulated from said at least two electrodes.
- 30 5. The array according to claim 1, wherein said shield electrode is integrated with one of said at least two electrodes.
- 35 25 6. The array according to claim 1, wherein the plurality of shields of said shield electrode receive the same potential.

7. The array according to claim 1, wherein the plurality of shields of said shield electrode receive a potential different from a potential applied to said at least two electrodes.

5 8. The array according to claim 2, wherein the aperture of each shield of said shield electrode is larger in size than the apertures of said at least two electrodes.

9. The array according to claim 1, wherein
10 said at least two electrodes include first and second electrodes,

each of the first and second electrodes has a plurality of electrode elements with apertures on the paths of the plurality of charged-particle beams,

15 the plurality of electrode elements of the first electrode are grouped in units of rows in a first direction, electrode elements which belong to each group being connected, and

the plurality of electrode elements of the second electrode are grouped in units of rows in a second direction different from the first direction, electrode elements which belong to each group being connected.

10. The array according to claim 9, wherein the first direction is perpendicular to the second direction.

25 11. An electrooptic system array having a plurality of electron lenses, comprising:

upper, middle, and lower electrodes arranged

along paths of a plurality of charged-particle beams,
said upper, middle, and lower electrodes having
pluralities of apertures on the paths of the plurality
of charged-particle beams;

- 5 an upper shield electrode which is interposed
between said upper and middle electrodes and has a
plurality of shields corresponding to the respective
paths of the plurality of charged-particle beams; and
a lower shield electrode which is interposed
10 between said lower and middle electrodes and has a
plurality of shields corresponding to the respective
paths of the plurality of charged-particle beams.

12. The array according to claim 11, wherein said
middle electrode includes a plurality of electrode
15 elements having apertures on the paths of the plurality
of charged-particle beams.

13. The array according to claim 12, further
comprising a middle shield electrode between the
plurality of electrode elements of said middle
20 electrode.

14. The array according to claim 13, wherein the
plurality of electrode elements of said middle
electrode are grouped, and electrode elements which
belong to each group are electrically connected to each
25 other.

15. The array according to claim 13, wherein the
plurality of electrode elements of said middle

TOP SECRET//COMINT

electrode are grouped in units of rows, and electrode elements which belong to each group are electrically connected to each other.

16. The array according to claim 11, wherein said middle electrode has a plurality of electrode units electrically separated in units of rows, and each electrode unit has a plurality of apertures on the paths of corresponding charged-particle beams.

17. The array according to claim 16, wherein each electrode unit has a rectangular shape.

18. The array according to claim 11, wherein the respective shields of said upper and lower shield electrodes have apertures on the paths of the charged-particle beams.

15 19. The array according to claim 11, wherein
said upper shield electrode is constituted by
integrating the plurality of shields, and
said lower shield electrode is constituted by
integrating the plurality of shields.

20 20. The array according to claim 11, wherein
said upper shield electrode is insulated from
said upper and middle electrodes, and
said lower shield electrode is insulated from
said lower and middle electrodes.

25 21. The array according to claim 11, wherein
said upper shield electrode is integrated with
said upper electrode, and

20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95

said lower shield electrode is integrated with said lower electrode.

22. The array according to claim 11, wherein the plurality of shields of said upper shield electrode and 5 the plurality of shields of said lower shield electrode receive the same potential.

23. The array according to claim 11, wherein the plurality of shields of said upper shield electrode and the plurality of shields of said lower shield electrode 10 receive a potential different from a potential applied to said upper and lower electrodes.

24. The array according to claim 12, wherein an aperture of each shield of said upper shield electrode and an aperture of each shield of said lower shield 15 electrode are larger in size than an aperture of said middle electrode.

25. The array according to claim 11, wherein an interval between said middle electrode and said upper shield electrode and an interval between said middle 20 electrode and said lower shield electrode are smaller than a pitch of a plurality of apertures of said middle electrode.

26. A charged-particle beam exposure apparatus comprising:

25 a charged-particle beam source for emitting a charged-particle beam;

an electrooptic system array which has a

plurality of electron lenses and forms a plurality of intermediate images of said charged-particle beam source by the plurality of electron lenses; and

- a projection electrooptic system for projecting
5 on a substrate the plurality of intermediate images formed by said electrooptic system array,
said electrooptic system array including:
at least two electrodes arranged along paths of a plurality of charged-particle beams, each of said at
10 least two electrodes having a plurality of apertures on the paths of the plurality of charged-particle beams;
and
15 a shield electrode which is interposed between said at least two electrodes and has a plurality of shields corresponding to the respective paths of the plurality of charged-particle beams.

27. A charged-particle beam exposure apparatus comprising:

- a charged-particle beam source for emitting a
20 charged-particle beam;
an electrooptic system array which has a plurality of electron lenses and forms a plurality of intermediate images of said charged-particle beam source by the plurality of electron lenses; and
25 a projection electrooptic system for projecting on a substrate the plurality of intermediate images formed by said electrooptic system array,

- 100-200-300-400-500
- said electrooptic system array including:
 upper, middle, and lower electrodes arranged
 along paths of a plurality of charged-particle beams,
 said upper, middle, and lower electrodes having
5 pluralities of apertures on the paths of the plurality
 of charged-particle beams;
- an upper shield electrode which is interposed
 between said upper and middle electrodes and has a
 plurality of shields corresponding to the respective
10 paths of the plurality of charged-particle beams; and
 a lower shield electrode which is interposed
 between said lower and middle electrodes and has a
 plurality of shields corresponding to the respective
 paths of the plurality of charged-particle beams.
- 15 28. A device manufacturing method comprising the
 steps of:
 installing a plurality of semiconductor
 manufacturing apparatuses including a charged-particle
 beam exposure apparatus in a factory; and
20 manufacturing a semiconductor device by using the
 plurality of semiconductor manufacturing apparatuses,
 the charged-particle beam exposure apparatus
 having:
 a charged-particle beam source for emitting a
25 charged-particle beam;
 an electrooptic system array which has a
 plurality of electron lenses and forms a plurality of

intermediate images of the charged-particle beam source by the plurality of electron lenses; and

a projection electrooptic system for projecting on a substrate the plurality of intermediate images

5 formed by the electrooptic system array,

the electrooptic system array including:

at least two electrodes arranged along paths of a plurality of charged-particle beams, each of the at least two electrodes having a plurality of apertures on

10 the paths of the plurality of charged-particle beams;
and

a shield electrode which is interposed between the at least two electrodes and has a plurality of shields corresponding to the respective paths of the plurality of charged-particle beams.

29. The method according to claim 28, further comprising the steps of:

connecting the plurality of semiconductor manufacturing apparatuses by a local area network;

20 connecting the local area network to an external
network of the factory;

acquiring information about the charged-particle beam exposure apparatus from a database on the external network by using the local area network and the

25 external network; and

controlling the charged-particle beam exposure apparatus on the basis of the acquired information.

- TUEDEC-19860860
30. A semiconductor manufacturing factory comprising:
a plurality of semiconductor manufacturing
apparatuses including a charged-particle beam exposure
apparatus;
- 5 a local area network for connecting said
plurality of semiconductor manufacturing apparatuses;
and
- a gateway for connecting the local area network
to an external network of said semiconductor
10 manufacturing factory,
- said charged-particle beam exposure apparatus
having:
- a charged-particle beam source for emitting a
charged-particle beam;
- 15 an electrooptic system array which has a
plurality of electron lenses and forms a plurality of
intermediate images of said charged-particle beam
source by the plurality of electron lenses; and
- a projection electrooptic system for projecting
20 on a substrate the plurality of intermediate images
formed by said electrooptic system array,
- said electrooptic system array including:
 at least two electrodes arranged along paths of a
plurality of charged-particle beams, each of said at
25 least two electrodes having a plurality of apertures on
the paths of the plurality of charged-particle beams;
and

TOP SECRET//EUEGTR860

a shield electrode which is interposed between said at least two electrodes and has a plurality of shields corresponding to the respective paths of the plurality of charged-particle beams.

- 5 31. A maintenance method for a charged-particle beam exposure apparatus, comprising the steps of:

preparing a database for storing information about maintenance of the charged-particle beam exposure apparatus on an external network of a factory where the
10 charged-particle beam exposure apparatus is installed;

connecting the charged-particle beam exposure apparatus to a local area network in the factory; and

maintaining the charged-particle beam exposure apparatus on the basis of the information stored in the
15 database by using the external network and the local area network,

the charged-particle beam exposure apparatus having:

a charged-particle beam source for emitting a
20 charged-particle beam;

an electrooptic system array which has a plurality of electron lenses and forms a plurality of intermediate images of the charged-particle beam source by the plurality of electron lenses; and

25 a projection electrooptic system for projecting on a substrate the plurality of intermediate images formed by the electrooptic system array,

/

the electrooptic system array including:
at least two electrodes arranged along paths of a plurality of charged-particle beams, each of the at least two electrodes having a plurality of apertures on
5 the paths of the plurality of charged-particle beams;
and
a shield electrode which is interposed between the at least two electrodes and has a plurality of shields corresponding to the respective paths of the
10 plurality of charged-particle beams.

186927 202207162950